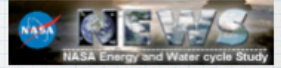
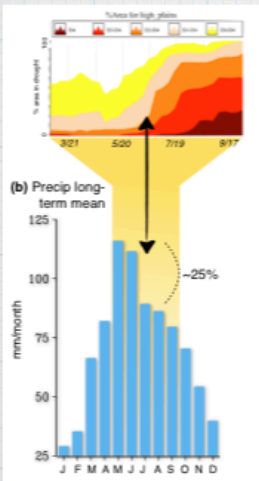
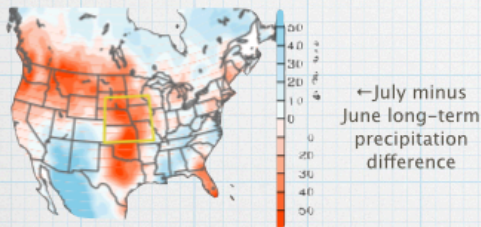
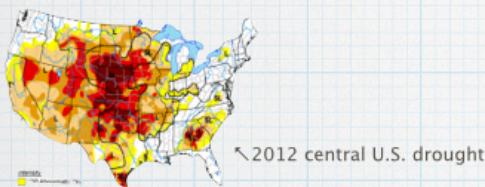


Flashiness of drought in 2012: Climate change signal and prediction hopeful

S.-Y. Simon Wang, Joseph Santanello, Hailan Wang, Daniel Barandiaran, Rachel Pinker, Siegfried Schubert, Robert Gillies, Robert Oglesby, Kyle Hilburn, Ayse Kilic, and Paul Houser,
(corresponding: simon.wang@usu.edu)

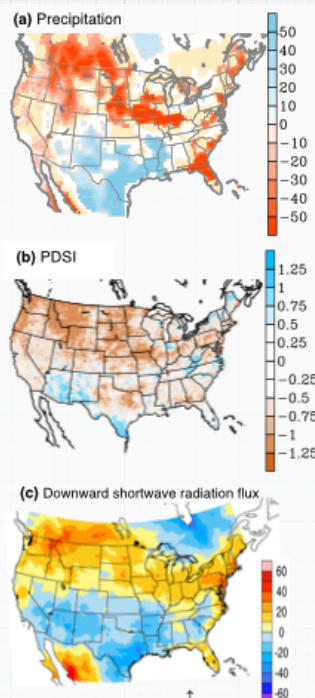


During the seasonal transition from June to July, precipitation in the central U.S. decreases by about 25% and this precipitation decrease has been observed to have intensified since 1979. Such an intensification could enhance future spring drought occurrences such as was the case in the 2012 "flash drought" in the Midwestern U.S. We analyzed various atmospheric and land reanalysis datasets to examine the trend calculated from 1979 to 2012 in the June-to-July seasonal transition. The change in precipitation deficit was accompanied by increased downward shortwave radiation flux and tropospheric subsidence, enhanced evaporative fraction, and an elevated planetary boundary layer height. The change in the tropospheric circulation encompassed an anomalous ridge over the western U.S. and a trough on either side; this wave-form circulation pattern. The knowledge of the trends allows one to anticipate the evolution of spring onset of drought into the summer.

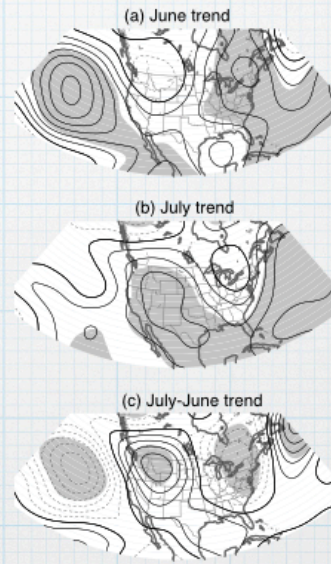


← Drought evolution during 2012 showing the percent of areas under drought from March to September.

← Long-term mean monthly precipitation over the Central Plains signifying the June-to-July decrease of rainfall (i.e. seasonal drought).



Linear trends in the July-June difference of (a) precipitation (CRU), (b) PDSI (PRISM data), and (c) downward shortwave radiation flux (NLDAS-2).



Monthly streamfunction change post-1979 in (a) June, (b) July, and (c) July-June transition; contour interval is 1.5×10^6 . Shadings indicate significance at the 95% confidence interval, and "H" and "L" indicate high and low pressure.

↓ Percent of contribution of the 1979–2011 trend in the July–June (a) PDSI, (b) precipitation, and (c) ST 200 hPa to their 2012 values, showing same-sign values both in 2012 and trend.

